Formale Baumsprachen

Task 18 (relabelings)

(a) Show that any relabeling preserves the image under pos.

Let Σ and Δ be ranked alphabets.

(b) Under which conditions is there a relabeling between trees over Σ and trees over Δ?

(c) Let τ be a relabeling between trees over Σ and trees over Δ. Now consider $\sigma \in \Sigma$, $\xi \in T_\Sigma$, and $L \subseteq T_\Sigma$. Quantify τ in the following expressions:

(i) $\tau(\sigma)$, (ii) $\tau(\xi)$, and (iii) $\tau(L)$.

Task 19 (construction of Bar-Hillel, Perles, and Shamir)

Consider the ranked alphabet $\Sigma = \{\sigma^{(2)}, \alpha^{(0)}, \beta^{(0)}, \lambda^{(0)}\}$ and the fta $\mathcal{A} = (Q, \Sigma, \delta, F)$ where $Q = \{e, o\}$, $F = \{e\}$, and

$$\delta_\alpha = \delta_\beta = \delta_\gamma = \{(\varepsilon, o)\}, \qquad \delta_\sigma = \{(oo, e), (ee, o)\}.$$

Moreover, let us assume an fsa $\mathcal{B} = (P, \Delta, p, \mu, G)$ where $\Delta = \Sigma^{(0)} \setminus \{\lambda\}$, $P = \{p, r\}$, $G = \{r\}$, and

$$\mu = \{(p, \alpha, p), (p, \beta, r), (r, \beta, r)\}.$$

Using the technique from the lecture, construct an fta $\mathcal{A}'$ such that

$$L(\mathcal{A}') = L(\mathcal{A}) \cap \text{yield}_\lambda^{-1}(L(\mathcal{B})).$$

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